What else we do while driving: towards the driverless car

Chapter 11

What Else We Do While Driving: Towards the 'Driverless Car'

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Introduction

How is driving connected to sociality? What modes of social interaction might we expect to decline when motorcars no longer need a human driver? After an initial discussion of how driving a car has become less to do with expressing identity and more to do with inhabiting a space, we will draw on empirical work undertaken by one of us (Laurier) that shows how social interactions within the car between driver and passengers are occasioned and interlaced with the process of driving. This leads onto a discussion of how 'driving' and the uses of the car will change as the car becomes an autonomous transport device that does not depend on a human 'driver'. The driverless car is a technical possibility now and there are many developments in auto-technology that presage its imminence. What then might be the implications for social life inside the car and social relations between those inside and outside the car? From an empirical account of what else currently goes on while driving, we will explore what might be expected if the large parts of the work of driving were delegated to the car.

Driving and Inhabiting the Car

In the early years of the twentieth century just to own a car was a sign of social status, later the styling and modelling of the vehicle became important and this has been a long focus for analysts of culture not least Roland Barthes. The car is of course about much more than its appearances, its significance is in the driving or, as Barthes put it, in *handling* it: '… it is not the forms or functions of this 'very ordinary thing', that are going to appeal to human dreams, it is its handling. Perhaps soon it is not a mythology of the car that must be written: it is a mythology of driving' (Barthes 1993: 1142). Driving a motorcar, became a profound technology, of the human hands. Within the constraints of the traffic and the road system the car allows the human to move freely and the feet which would normally carry a load acted instead as a second pair of hands handling the pedals on the floor. The assemblage of car and person refitting the perceptions of the driver just as the cane does the visually impaired. The driver's hands and feet operate controls that for the competent driver are not longer noticed as controls but instead as directly realising her or his intentions. The slightest changes in acceleration and braking are produced with the fluidity of the pedestrian keeping up or falling behind another pedestrian. No other animal does anything like driving and Raymond Tallis describes how even in a modern vehicle the human hand is essential to achieve driving: 'The car largely runs itself and the steering is powered, but we are still

required to grip the steering wheel and manipulate it directly in order that the car shall follow the route to our destination' (Tallis 2003: 177). What is peculiar and fascinating about the car is that passengers can also be drawn into driving because they also see and feel what is going on inside and outsite the car. Driving together is a form of moving and being together which needs to be understood in its relationships with walking together, running together, travelling by bus together and those various other modes of social groups moving while retaining their togetherness. Even in the 1960s Barthes was arguing that the rising number of cars on the road made sporty driving impractical and distinctive performance was neutralised by the increasing similarity of cars. These constraints on 'sporty' car have led the external styling of cars to express speed and elegance to give way to cars that offer distinctive modes of habitation. As well as the standard saloon we have seen the mini, super-mini, estate, executive saloon, 4X4, and MPV, which all provide different sorts of spaces for sociation. The coupé, the sports car and the sports saloon may continue to offer something 'sporty' – but as important is the restriction on the number of occupants they allow.

Driving a car has become an even more ordinary thing since Barthes first brought handling to our attention. By 2006 in the UK 82% of people lived in a car-owning household while 70% of all adults had a driving licence (DfT 2008). Since the end of the twentieth century, the impact of personal income on car ownership has dramatically declined and car availability for women, for older people and for people in lower income groups has increased since 1997 (Lucas and Jones 2009: 55–60). Over the period 1997 to 2006 'the proportion of non-drivers in non-car owning households has dropped sharply in the bottom two quintiles and hardly changed in the top two quintiles' (Lucas and Jones 2009: 60). As cars have become the predominant mode of private transport, for getting to work, for visiting friends, for going to leisure and social activities, their social functions have continued to spread and diversify. By 2006, across Britain, as a whole, 80% of all miles travelled were by car as either a driver or a passenger and 63% of trips were made by car (DfT, 2008). The car's connective role in maintaining social relationships to each other and the everyday human logistics of work and life is not simply a matter of choice because 'car dependence' is often structurally and situationally determined (Lucas and Jones 2009: 120). Alternative modes of transport come with economic, psychological, social and emotional costs to many individuals and an obvious economic cost to society as a whole (Lucas and Jones 2009: 133).

During the twentieth century cars and driving became increasingly entwined with society and with the sociality that makes society what it is: at this historical moment the car's importance in transportation is unquestionable (Urry, 2008). For as much as driving realises sociality through transporting people to join

together at meetings, it also form of moving together that car journeys occasion. Barthes' discussion of the mythology of the car in the 1960s distinguished between the 'sporty' – to do with the power of the car and how that was manifest in its appearance – and the 'domestic', the car as a mobile intimate, social space:

> One recognises in all this a dream which is common to the car and the house: an intimacy which must be continually preserved and restored, because undoubtedly it expresses the most secret and subtle feeling of ownership. (Barthes 1993: 1140–41)

The protection, containment and privacy of the domestic car works, Barthes argues, like the nomad's travelling home because it is a space of intimacy which also expresses ownership. The domesticity of the car offers the dream not of travelling through familiar and strange places yet never losing the ownership of the immediate space around oneself. Like the home, it is a private space in which individuals can express themselves through a series of practices that include maintaining it, cleaning it, the manner of driving it, the way of talking about it and ways of talking in it. Yet unlike the home our intimate life is not hidden by curtains and walls, it is hidden intermittently by moving past and away the views of others. So what do the nomads of the car do on their journeys?

With the growth in the use of the car for transportation has come a growth in the time that members of society spend together in the car doing all the other forms of work and play they do whilst on the move (Bull 2004; Juhlin 2005; Laurier 2004; Laurier et al. 2008; Merriman 2007). It has become an extension of both home and work for the social relationships between occupants of the car. For these relationships to do their work, they have to be interwoven with the primary demands of driving the car in traffic. Social life in the car is thus full of necessary pauses and interruptions when the driver's attention, and sometimes that of passengers, has to turn to controlling the vehicle. If we consider for a moment the family car, as well as being an outward expression of who is inside for other travellers on the road, these, usually slightly roomier, slower and cluttered vehicles provide a domestic space in which the family organises itself, talks to itself and looks after itself (Sheller 2005). The conversations that happen here are in private, protected from intrusions and the enclosed space prevents family members walking off (as they might in family home). As we have noted it is a family space without curtains, its intimacy gained instead by the constant movement of the car away allowing others only glimpses of its interior. There are though, of course, intrusions for the driver from other drivers, traffic lights and the demands of the road.

Before considering the interesting possibilities raised by the driverless car, it makes sense to consider what practices take place during car journeys. We will examine the social organisation of driving and other car-

based activities by drawing on data from an ESRC-funded project studying in-car interaction called 'Habitable Cars'[1] (Res-000-34-9758). On the bases of the sections that follow we can then return to a more speculative mode on what some of the consequence of the driverless car might then be for life inside the car.

Methodology

Over a two year period a substantial mobile ethnography was undertaken involving travelling with 18 vehicles and having those vehicles collect over 100 hours of video data of 'naturally occurring' (Lynch 2002; Potter 2002; ten Have 2002) interaction during car journeys. The 18 vehicles were selected to give insights into car poolers commuting to work, families commuting and, finally, friends and acquaintances travelling together. From selecting for these three groups, the project also ended up with a varied collection of ages, gender and class backgrounds for the occupants of the cars. The data were gathered from a two-week 'follow and film' structure. In week one the project researcher joined and 'followed' the participants for six of their typical trips. In week two participants were asked to record six of their typical journeys (e.g. 'film'). Generally, this procedure worked well in practice. Week one allowed immersion in the journey, which provided traditional ethnographic understandings of practice and contextualised the video data gathered in the subsequent period. Not all of the vehicles could practically accommodate the researcher in week one, since for families and a hill-running club the cars were full and, in these cases, more traditional interviews were relied on.

Figure 11.1 'Lipstick camera'

[1] http://web2.ges.gla.ac.uk/~elaurier/habitable_cars/.

Figure 11.2 Camcorders in foam cubes

Commercial user-testing of cars is often carried out by recording how the car is used via a number of 'lipstick cameras' (see Figure 11.1) These tiny cameras are fitted throughout the vehicle, benefitting from being inconspicuous, if expensive. While commercial research projects use these concealed camcorders to produce extensive coverage of problems and successes discovered once the car is being driven in the 'real world' rather than on a test track, the observational cars have to be specially adapted and thus ownership of these costly vehicles is in the hands of the developers rather than car purchasers. In a collaborative research project in France with Peugot, Mondada (2004) noted that for naturalistic studies a method of recording is required which is less disruptive to the pre-existing ecologies of the automobile. In her project this involved two cameras with fish-eye lenses and Velcro mounts. Even though the visible presence of the camcorders was more obvious, the advantage lay in being able to attach them to the vehicle belonging to the volunteer taking part in the research and, in that sense, preserve their existing ecology within the car.

The video data presented in the next section were derived from two camcorders providing car-interior and forward views of the road. Consumer camcorders were used which were beneficial in terms of their small size and ease of use for participants. Normal lenses have a limited angle of vision and to compensate for this and provide for a similar perspective to the human eye, semi-fish-eye lenses were attached to the camcorders. The camcorders were housed in soft foam cubes to reduce vibration and to allow for easy attachment and removal by participants. Given the level of background noise from road rumble, engine roar and airflow, the audibility of

conversations was remarkably good and a testimony to the properties of foam and modern car design. Compared with video studies in public places carried out in previous video research (Brown et al. 2005; Laurier and Philo 2006), the car was a fruitful place for recording interaction because its occupants did not move in and out of microphone range.

Two hundred and forty hours (total, rather than synched) footage was recorded by participants. The raw footage was captured and then compressed using iMovie HD and QuickTime Pro into twin-video-track, split-screen MPEG files. Clip selection was undertaken as soon as the raw footage was returned. The footage was watched from beginning to end by the project researcher on a daily basis, during which time clips were marked out. Six hundred and fifty clips were produced in this way, varying between 30 seconds and 5 minutes in duration. These selected clips were returned to participants on a DVD for their approval. There are alternative workflows used by video analysts at the University of California which involve capturing clips and synching them in a professional editing package and then mastering them to multiple angle DVDs (Koschmann 2006). In the case here the preference was for the simplicity and portability of QuickTime files, along with ease of use in qualitative analysis software such as CLAN or ELAN (Heath et al. 2010). Individual clips were viewed numerous times in regular data sessions (Heath et al. 2010) to gradually immerse the analysts in the activities occurring. Rather than coming armed with hypotheses for testing, the principle of the session was to find, and sometimes to be surprised by, the social phenomena present in the film clips, and to consider how activities were organised at source by those present in the car. As dialogue and conversation deepened in response to any clip, notes were kept, and transcripts annotated and corrected. These transcripts and notes provide the bases for findings presented in publications such as this one.

Findings: Cars In, Within and Places for, Interaction

We will begin to report on the nature of how we interact in the car with the one activity shared by all cars in all journeys: *driving*. Our concern was to move away from the individualised depiction of driving common in cognitive research (Groeger 2000) and approach driving as an activity accomplished together with others, both inside and outside the car (Haddington 2010; Nevile and Haddington in press; Watson 1999). Fundamental to the latter's social organisation were, of course, other drivers and, for the former, passengers. Driver-passenger interaction is remarkably absent from existing studies of car driving. In the video data these two types of actors are co-involved in all manner of tasks. To begin with the traffic interaction, while driving both drivers and passengers made rapid analyses of cars in front and beside with an array of traffic-generated, vehicle-generated person-references (Heritage, 2007) coming into play: boy-racer, Sunday driver, SUV, family car, bus, 'muppet',

white van man, drug-dealer etc. While some of these driving analyses were generated from other cars' actions, they were also used in a mutually elaborating manner in assessing and evaluating the actions of others on the road. Alongside making sense of what other drivers were up to through categorising the occupants and their vehicle, their actions were also analysed for their emerging intelligibility. Actions became reflexively understandable through drivers and passengers seeing their position in sequences of moves and in relation to the overall traffic gestalt (Ingold 2000; Livingston 2008). Other drivers, when noticed, were seldom seen to be simply 'driving', they were seen to be involved in courses of action such as: cruising, accelerating away from traffic lights, nudging into a traffic queue, being offered a gap in the traffic, pushing into traffic, cutting someone off, blocking a faster car behind.

Many public encounters between cars on the road were economically organised through recognitions and displays with the car itself in relation to previous, current and emerging traffic features. Simply by extending the gap between their car and a car in front in queued traffic, drivers could make an offer to another driver in a parallel lane during merging of traffic (see also Buscher xxx-xx this collection). Alongside using the car in relation to other cars and the road environment, drivers and front-seat passengers tailored particular gestures for their visibility. For example, they raised the back of the hand for thank you and the same gesture, used with different orientation and timing, to produce apologies for pushing through a gap in a traffic queue. Hazard lights were used just after successfully taking a spot in front in a traffic queue to show gratitude for this small generous offer by the driver behind. Equally, of course, headlights were flashed in reprimand of drivers cutting in and horns sounded when cars failed to pull away promptly at traffic lights (see also Laurier 2002).

As we have noted above, of equal import in the video data were the wide variety of everyday activities unrelated to driving occurring between passenger(s) and driver within the car. In this short chapter we can only give a hint of these:

storytelling – all manner of shorter and longer tales were told in conversation during longer journeys;

learning – parents teaching children, colleagues teaching colleagues, members of sports clubs sharing technical tips etc.;

caring – friends showing concerns for the troubles of one another, remembering birthdays, offering solace when the other suffered grief;

planning – mum's week ahead, colleagues' day ahead, holidays, sports events etc.;

complaints/telling of troubles – children telling parents on school runs, car sharers of their troubles at work;

mundane economics – planning purchases, evaluating purchases, sharing information on mortgage interest rates;

listening to radio news/music/stories – an activity which turned into discussing news items, singing along to music;

delivering news – all manner of more or less impersonal natures, sometimes dramatic such as when one car sharer told another of his mother having been told she only had a few months to live;

remembering – occasioned by other reminiscences or things seen from the window or heard on the radio;

reviewing sports performance – during the homeward journey after a race in three cars hill runners' cars, runners would analyse how they had done;

telling jokes;

teasing;

pleading;

playing games;

singing;

fighting/arguing;

looking at rural landscape, towns;

etc.

A number of these activities have been examined at greater length in other papers from the project (Laurier 2010a, 2010b; Laurier et al. 2008; Laurier and Lorimer forthcoming). What we can do here, though, is note where the setting of the car does make a difference. Broadly, in relation to the talk that happens in the car – the topic generation, and topic sequencing of conversations are assembled by car travellers in relation to the arc of a journey from its beginning to its end. For car occupants there is a sense of first business being attended to when the journey begins: greetings, producing and receiving news ('get up to much at the weekend?', 'how was France?'). For car occupants with a shared sense of a route (e.g. families on a school run or car sharers commuting) comes an awareness of where and when to tell a tale (for instance, reported troubles are entered into when the teller judges there to be adequate slot to tell them within). As the journey heads towards its close, stories, pleas, trouble-tellings orient toward this feature and either begin to mark how they can be returned to later or completed in time.

At a more fine-grained resolution the features used by speakers to manage turn transitions in a conversation, to display reception of news or complaints and so on (Maynard 2003; Schegloff 2007) are

adjusted to, and sometimes disrupted by, the finer rhythms of car travel such as corner turning, application of brakes or parking. If we compare how people talk in the car compared to how they talk during phone calls, silences during conversations in the car are far less accountable. After only a very few seconds of silence on the phone from a respondent we check as to whether there is a problem with line or some more profound issue arising. In the video data there was an abundance of 'pauseful' conversations which leant themselves to what were often fairly therapeutic discussions in the car (see an institutional borrowing of this function in Ferguson, 2009). It was not unusual for car sharers, family members and friends to enter into conversation on serious matters while on long journeys. A further feature of the car that was relevant to the development of serious topics is the car's specific embodied orientation: side-by-side and in rows. Where the face has been central to monitoring of response and emotion this is refigured in the car. This perhaps reduces the intensity of face-to-face mutual monitoring and thus allows for recuperative withdrawals when difficult topics are broached. The front-seat passenger can monitor the driver for facial responses, while for the most part the driver cannot do the same in reverse. Instead of the closely attended play of gaze, eyebrows and mouths (Peräklyä 2004), head movements instead do a lot of the 'heavy-lifting work' for displaying attention, acknowledgment, receipt of various items and so on. Alongside this drivers still managed with considerable skill to dart in with glances at appropriate slots when the road ahead was quiet or the car sat at traffic lights.

Driving can also lay claim to being the source of a new human emotion, or not really new but an old emotion in a new place: 'road rage' (Katz 1999). Recent theoretical work in sociology, human geography and mobility has turned toward the importance of emotion and, more widely, affect (Thrift 2007) yet it has tended to be either in individual or general cultural framings rather than through the logics of its occurrence in local circumstances. Interactional research on emotional states, expressions and stance (Goodwin 2007) shows how rather than emotions being private mental causes or sensations they are, in being expressed, part of the intersubjective architecture within and through which social action happens. The video data continually documented the uncertainty of response by others to the expression of emotions by drivers and passengers – be they irritation with other drivers, amazement in 'tall stories' or amusement over a memory from childhood. Equally, the recordings from the cars brought to our attention a greater variety of emotions travelling inside cars than solely rage or calm and a greater variety of objects and parties than other drivers.

To provide a better sense of this we will provide an example from the video corpus. The family (mother, father (in front seats) and daughter (in the back seat behind the dad)) that we join here are at a classic occasion for a family argument. They have taken a detour around the centre of London to avoid the Congestion Charging

Zone. At the outset Jess, the mother, confidently claimed knowledge of a 'right turn' that would allow them to travel a route between two hospitals avoiding the 'Zone'. The journey between two hospitals is being made in order to track down the belongings of a chronically-ill grandmother. The reason and responsibility for the journey thus connects in a particular fashion to each occupant of the car through a familial logic – in particular, morally locating Jess as responsible for the trip because the grandmother is her mother. Part of the background to what is happening is also that Jess has, by dint of living closest to the hospitals, become the primary carer for her seriously ill mother. Most of the visits to grandmother in the old and new hospitals were done using the family car.

From the outset of this journey a key question for Jess and Steve (the father) was the existence of 'the right turn' that could be made to connect to the hospital. Steve, although having expressed scepticism over the existence of this right turn, has nevertheless continued driving the family along the route. After the lengthy disagreement earlier in the journey over the right turn, Jess has an increased stake in finding this road turning that she had been so certain about. One of the questions that travelling together in the car as a family produces is, as noted earlier, the potential categories in play – in this case father/driver/route-follower and mother/passenger/navigator. These categories are not definitively decided for entire journeys, rather they are potential categories made relevant in courses of action on the road and/or through actions being accomplished through talk.

The family, having successfully skirted the Congestion Charging Zone, arrive at the road in question, at which point, of course, they will discover whether they can turn right or not. The mother – Jess – in the front passenger seat, says 'be careful' and, almost as she says this, the car drives past a right turn. Jess rejects that turn as being the correct right and they continue up the road. As they progress it becomes less and less likely there is another right turn that they can take. Having been certain of her route Jess faces the impossibility of making such a right turn. At the top end of the street there is a barrier in the middle of the road that prevents any possibility of a right turn. Jess, who has been looking less and less confident, gets upset. As we see in the transcript below, when Jess's claim collapses and she becomes upset, Steve steers both her – and the car – out of trouble. In the interaction between Steve and Jess we begin to catch elements of how the family exists in its intimacy, its long histories of faults and forgiveness and its caring for and of its members. From the transcripts we can pursue more closely how in this specific case a number of complex actions, emotions and emergent features of wayfinding are related to one another.

In the transcripts below we join them at the moment when Jess moves from dismay (see first sketch in transcript) to expressing her despair (second sketch). Steve has just changed lanes, abandoning Jess's direction-giving and is about to say 'to just go' what he is about to do next when he is cut off by Jess.

S: So I'm [going to just go]
+
J: [OH JUST GO home, go home]
+
S: [no no]

J: NO GO HOME
J: OH [•]JUST GO home, go home

Jess's expressions of despair at having lead the family up a blind alley show in their pitch that 'home' is the term to re-ignite the 'family' for these car occupants as a group struggling to find a way through the city. Using 'home' collects the car's occupants as a family even as it also marks its opposition to the onward movement of the car and is the place where the mum, as distressed family member, would want to retreat to. The spontaneity of this emotional occurrence is evident in the timing of its interruption of Steve's proposal before he has finished. By following the preceding course of action we can see how this upset does not come out

of nowhere. Although this is how she feels at this moment, it is a feeling that comes after a stepwise progression from confidence at the outset of their detour then to nail-biting agitation and finally nail-biting withdrawal before the moments transcribed above. Throughout Steve has been displaying his orientation to her changed emotional displays and tailoring his epistemic claims toward a non-confrontational stance.

Given that it is publicly available that an upset is in the offing, it should be no surprise to us that Steve does not take Jess's directions literally and turn the car homeward. Jess is not providing anything that should be taken as a reasonable next step in reaching the hospital, all the more so because within the journey itself as unit, they have almost completed it. After driving for several miles around the centre of London, their final destination, the hospital, is only a block away. Were they to go home Jess would be the one who stands to lose most by this action since it is her trip. Her 'GO HOME' is thus analysable in terms of how it affects those in the car differently. Clearly for the husband and daughter there is only a limited loss because it is not really their trip that is being given up. It is Jess as the primary carer for the grandmother who would suffer were her directive to be acted upon by Steve.

What Steve does is to begin to repair the situation with his 'no no'. This is a repair which deals with the likelihood that Jess has taken his previous lane change as an accusation that she had been wrong all along about her detour. Once Steve gets the chance to speak again: 'I'll go left and back round. Yeah. Coz then you'll have lights in your favour won't ya.' Steve is able to assuage Jess's distress by formulating his lane change as a road manoeuvre that will allow them to take the right turn after all. There is a marvellous adjustment in what then follows to a more explicit support and encouragement of Jess in the switch from 'I' to 'you' in saying the traffic lights will be in 'your favour'. It is striking because it combines helping Jess see the good side of having to do an extra manoeuvre with simultaneously handing agency for the journey back to Jess by switching from 'I' to 'you'. Should Jess come back at this point Steve will return to being merely the driver again, following directions. Because the car is at rest he is also able to turn to Jess to pursue a response:

S: I'll go left and back round (2.0)
S: You know ((looks across at J)) Coz then you'll have lights in your favour won't ya ((looks across at J again [•]))

J: [Well I just need to get to the bottom of this
+
[((waves envelope))
[((Steve looks across))

Jess shows her understanding of having been made responsible for the journey again by restating why she has asked them to make this trip in the first place and indeed placing that responsibility outside of her direct desires by waving the envelope. The envelope contains the list of items lost between the hospitals and that has indeed been the reason for the journey.

What we begin to see in this episode is the convergence of the tasks of driving and wayfinding with the responsibilities for caring for elderly parents and the responsibilities for immediate family in the car. We have a sense, probably from our own experience, of how these wayfinding failures often lead to family arguments, here though we see the skilful work of Steve in handling Jess's distress only seconds after dealing with the demands of driving. Just as she is looking after her mother, Steve in turn is looking after Jess through the journey of the car on that day.

Returning to the more general findings from the video data one subset of passenger occupations during journeys that was particularly striking was the active solicitation and reception of new skills and knowledge by passengers but also by drivers. Reminiscent of studies of everyday mathematics or 'outdoor psychology' (Lave 1998) during journeys we found a number of instances of school subjects tuition, hygiene, banking (as noted earlier), compass reading and others, being learnt by both passengers and drivers in a curiously de-situated learning moment. Yet at the same time we found more conventional forms of situated learning. When young adults were in the front seat this often used as an occasion to be shown by the parents how to look at and analyse

the traffic, particular vehicles, roads and actions of other drivers. Learning to drive, like learning to cross the road, thereby being an activity that was potentially initiated and embedded in the family's organisation as much as in formal driving lessons.

It hardly needs saying that the focus of existing transport research on the driver in the car has thus missed a massive collection of related activities undertaken by the driver and passenger(s) collectively in the car (Thrift 2004). Below we have quite a different sort of social activity occurring, a discussion of a recent purchase made by the passenger (Greg). In this case the car is on a straight stretch of dual carriageway with minimal driving tasks to be undertaken. Although Ford is driving and does remain oriented to the fast-moving traffic ahead, he can easily offer his knowledge of how much a mountain bike with rear suspension would cost. In contrast to the earlier episode with the family where the car manoeuvres and journey itself are of consequence here they are not at all. Ford and Greg could as easily be sitting in a cafe or a bar pursuing whether Greg got a good deal on his recent mountain bike purchase or not.

G: Back is for the real flash boys. Plus it's (.) to get (.) to get a good rear suspension on the frame you've got to spend [500]
+
F: [900 plus]
G: quid on a frame alone
F: Yep yep I know that. Otherwise it's kind of kid-on stuff
G: Yeah
F: Yep (1.0)
G: And you only really need it if you're doing downhill extreme
F: Absolutely

Greg and Ford serve our purposes here in another sense because they are also an example of people who have been car pooling for a number of years. These car-based relationships have remained unexplored by those with an interest in transport aside from being seen as a constraint on the possibility of car sharing occurring at all. What we found from the ethnographic research, which was also manifest in video data, was that car sharing can become one of the significant steady relationships people have in their lives, not least because of the length of some arrangements, which in Ford and Greg's case has lasted for more than a decade. As importantly, car sharing is a daily, weekly, frequent form of being together with one another. We thus spent some time teasing

out the nature of what car poolers are to one another (Balch 2005). The relationship is peculiar: not quite flatmate, not quite friend, not quite neighbour, nevertheless in instances exemplifying qualities associated with each. Beginning with the latter, there were stories of simmering disputes growing between car sharers over lateness, sleeping, personality, political opinions. Like moving out of a flat, disputes over petrol money, sorting out logistics of who picks up who, where and when could lead to one dropping out of the relationship, though more likely daily clashes and post-journey complaints. The daily contact generates an intimacy in these relationships, which turned us towards how they are also an undocumented but important form of caring relationship outside of either family or work settings. Car sharers have levels of knowledge of one another more generally understood to exist in marriages, long-term partnerships and the most close-knit friendships (Lorimer and Laurier forthcoming).

What has hopefully become apparent in this section is that there are a number of car-related and car-agnostic practices occurring during any journey when there are one or more passengers in the car. From it we can reconceptualise the car as no longer merely just transport but also as a dwelling space where friends share their news, parents hear about trouble in classrooms and car sharers live out their relationship as car sharers – society, in other words, finding itself at work inside the tightly-squeezed space of the car. Driving itself becomes refigured as both interwoven with other secondary tasks in the car as well as benefitting from the navigational assistance of passengers.

The Driverless Car

As we have seen there is a range of social activities that go on inside the car that are entwined with the process of driving – but what happens when none of the people in the car is a driver. Will driving and navigation no longer be topics or resources for interaction or will be a lot more commentary on the car's driving and navigation given it will not a display a human driver's sensitivities? Driving-oriented discussions would then be reshaped – such as how to get from A to B – in trying to account for quite what the car navigation system is up to. The problems raised by Suchman (2007) around expert systems would apply equally here .The interaction between the driver and other drivers, or, between the 'driver-car' as a quasi-social entity and the 'crowd' of the surrounding traffic will have to be adjusted around the possibility of making sense of less skilful even if perhaps more persistent and unswerving automated drivers (Dant 2004; Dant and Martin 2001).

Putting the questions of automated drivers amongst human drivers, aside for the minute, once the car no longer needs a driver, those tasks needed for moving without incident – driving and wayfinding – will disappear and how the car is inhabited can be transformed. When we are travelling inside it, the car is a dwelling space within which, and from which, members of society live out significant parts of their lives. Its architectural characteristics of being small, with many windows and, of course, being mobile, provide a distinctive setting for everyday matters to take place in. While the driving together accomplished by Steven and Jess will be radically changed and the work of caring will be found in different occasion, those discussions like the one between Greg and Ford could flourish. Although if the car becomes more like a small railway carriage then the conversations of its passengers may well be displaced by more insular activities such as reading or working on a computer.

These social dimensions of the car are important to reconsider, partly because of the impossibility of continued growth in car use and partly because what the 'car' is, is evolving (Dennis and Urry 2008). While the petrol and steel box on wheels has persisted into the twenty-first century, other forms of fuel (diesel, bio-fuel, electricity, hydrogen fuel cell) are being developed that are leading to changes to the motor force of modern vehicles. Electric cars, for example, are likely to change the physical form of what a 'car' is because batteries are heavy and take up a lot of space and the restricted length of trips and dependence on being linked for hours to charging points will change how cars can be used (RCE 2010). For electric vehicles to become viable as a greener alternative to the fossil fuelled car, they will need to be supplied through a 'smart grid' by a source of lower carbon electricity than is currently available. Just as importantly, the car has become another site for the intervention of ubiquitous computing and new informational systems (Juhlin 2005; Östergren and Juhlin 2008). In attempting to build more energy efficient car coordination systems these, if successful, would reduce the independence and autonomy of the 'driver-car', linking one vehicle to another and to coordination systems that will charge for journeys as well as managing traffic flows.

In building energy efficient transport systems the very business of 'driving' could, at various points during any journey, disappear because sensors and servos could take over control of the car as its onboard systems interact with those in the road. Cars would become less like horseless carriages and much more like the carriages of a train, occupied only by passengers. The idea of individual transport units coming together to form a train of uncoupled units was of course behind the ill-fated Aramis rapid personal transit project (Latour 1996, see Laurier and Philo 1999). But perhaps the techniques of 'heterogenous engineering' have progressed to a point where the idea of relatively autonomous units linking up to share a journey and a guidance system is more realisable. Instead of trying to bring a technological dream into material reality by designing a 'complete object'

from scratch, progressively modifying the existing 'car system' through onboard and in-road control systems, a new form of car/train assemblage may come into being. It would require the removal of the individual driver's control beyond specifying the desired destination – and a number of steps towards this have already been made.

For some time drivers have taken synchromesh gears and motorised windscreen wipers for granted and now 'automatic' gears and power steering, once indicators of a luxury vehicle, are equally common. Servo systems open windows roof lights and even hard-shell open tops. Sensor-based monitoring systems can adjust the heat inside and respond to the outside environment by switching wipers and lights on and off. Cruise control is an optional extra that takes over managing speed and many vehicles have systems that continually adjust the tuning and responsiveness of the car. Anti-lock brakes and devices that control suspension and over-steering, take over from the driver without being summoned. Other sensory systems, such as reverse parking sensors and lane-swap warnings, are 'advisory' for the driver. On board SatNav or GPS systems may now show or tell the driver how to find their destination while also making the car visible to remote surveillance systems. The technology for 'smart' cars that communicates with a central system is already available – this means that the route, speed and style of driving could in principle be controlled from outside the vehicle (*Guardian* 2009).

It was the same US institution that brought you the internet, the Defense Advanced (Research?) Projects Agency, DARPA, who have brought the driverless car from a possibility to an actuality. In November 2007, Carnegie Mellon University won the DARPA 'Grand Urban Challenge' with a Chevrolet Tahoe equipped with sensor equipment, computers running complex programmes and motorised devices to control the steering, accelerator and brakes. Called 'Boss' by its team, the car is recognisable as an ordinary car, albeit an SUV with an MPG rating of about 14 miles to the gallon; it even has a steering wheel and could be driven by a person. In the DARPA challenge the electronic and mechanical gadgetry took the role of driver to take the car through a simulated urban environment including other cars negotiating the same streets. What is surprising is how rapid the emergence of the driverless car was. Just a few years earlier in 2004, when the DARPA Grand Challenge was much simpler and involved getting the vehicles to negotiate a 200-mile route on and off road, no teams completed the course and many didn't even manage to start. But in 2005 five teams successfully completed the same off-road challenge within 10 hours and the winner, 'Stanley', won in 6 hrs 54 mins.

There is much to gain from the promise of the 'driverless car' that replays a trope from science fiction in which technology relieves human beings of all effortful work and responsibility. We must presume the system would be consistently safe, because if it wasn't it would quickly create unpredictable mayhem – much worse than the limitations of fly-by-wire aircraft (Langewiesche 2009: 140–51). Driverless cars would follow rules,

abide by speed limits, and stop at stop signs without growing bored, tired or resistant to doing so. Even if they were unable to recreate the local and adjustable organisation of the social accomplishments of driving-in-traffic hinted at earlier, expert systems could however achieve the more mechanical responses of following changing speed limits according to weather or congestion. Variable speeds that produce motorway stop–go blocks would be reduced if not eradicated through the remote control and standardisation of vehicle speeds. The promise that the driverless car might lead to an increase in safety and a reduction in the pain and misery of car accidents, not to mention the cost and burden on health and emergency services, is very persuasive. But the ambition to reduce congestion may be confounded because the driverless car would make 'going by car' a more attractive travelling option than ever. It would have the advantages of door-to-door, privacy, personal and luggage space without the emotional stresses of driving. The driverless car would still provide quite a high degree of autonomy for the individual who could choose when to set off and probably have control over route within constraints. Importantly the car's owner or hirer would be able to choose who travelled with them and control the ambience (music, heating and so on) within their car. And of course journeys could be more ambitious because there would not be the same need to stop. The non-driver could sleep and have facilities installed in their car. Travelling at night would become much more attractive, more journeys could be made by car and they could thus also be longer. If collision levels could be eradicated it would mean that cars need not be made as steel cages with crumple zones, which would reduce weight, cost and fuel consumption. The cost of criminal activity could also reduced because the crimes of dangerous driving would disappear and it would be pretty uncool, if not impossible, to try to steal a 'driverless' car.

For drivers, however, the thought of giving over control of their car to someone – or something – else is an immediate matter of concern; could they entrust the mobility of their bodies to a hidden system? The idea of the 'driverless' car itself is unsettling, like the 'riderless horse' or the 'headless man' it suggests something has gone terribly wrong. The impulse to relax and do nothing, to be carried by a driverless car, seems to risk abdicating agency for what is happening to us. The possibility of personal expression through driving would disappear as drivers would lose the right to decide when to drive fast or slow, how close to drive to the car in front, when to let a particular type of car push out into the traffic and so on. The emotional satisfaction of mastery and control of the vehicle, along with the 'quest for excitement' are pleasures of driving that would be lost. Being able to reverse and park well, anticipating the road and adjusting the vehicle to the changing conditions, are all little pleasures in *driving* that would disappear with the driverless car. The pleasures of mastery are tied up with a commitment to 'take care', to be responsible for oneself, for one's passengers and for

other road users including those very vulnerable pedestrians and cyclists who lack a carapace. To drive is to accept an enormous burden of responsibility to other members of society. At a political level, the individual autonomy that is enjoyed by the car driver would finally become subject to state control, no longer simply through the law, but through control of the vehicle by the intelligent road system.[2] The citizen's right to object or breach the standard process of driving (e.g. to drive faster or slower than the 'system standard') would be removed and the possibility of arranging a road protest (driving slowly in convoy, clogging up lanes or cities) would disappear.

The moral status of the driver would also be removed; the responsibilities, rights and authority that go with taking control of a vehicle would be denied along with the social status conferred on the driver. In the rich industrialised cultures learning to drive is a rite of passage that signifies maturity, citizenship and inclusion in the society. The status of car drivers is linked to the autonomy they have over their own mobility but also to the responsibility it entails. Traffic has a moral order in the sense that having a number of cars on roads with other users is dependent on the mutual adherence to a shared set of rules and norms. Importantly there is the joint recognition of the formal rules by all road users – the law and the Highway Code – but there is a further tacit recognition of rights and obligations that leads to anger and dismay when they are breached (e.g. cutting in and tail gating – see Katz 1999). As the data referred to earlier show, these tacit rules are recognised in the ways that drivers interact as they treat the road as a public space, giving way to each other, recognising each other through 'civil inattention' (Goffman 1963) and sometimes interacting directly through nods, hand gestures and the flashing of lights. Driving in traffic is a situated interaction that depends on being able to anticipate and make sense of the developing line of other drivers' actions and as such it is a public performance of sociality in a similar way to walking through a public space – although with rather more at stake.

The driverless car would offer a new mode of domestic habitation as the person that currently has to serve as the driver would then become a passenger and the passenger who often has to serve as the navigator would be able to remain a passenger. Like those who travel by train, bus or plane now, they would be able to undertake with minimal interruption and reduced risk of distraction (Nevile and Haddington, in press) the many activities listed earlier. Many features of life in the car would remain the same, such as orienting to whether the journey is beginning, in its middle or close to its destination. What would disappear, however, are those gestures of good grace and bad temper that we associate with the moral order of traffic being either upheld or infringed.

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[2] 'It is as if the innumerable laws, regulations, and direction with which we must comply were driving the car, not we … Our spontaneity has been replaced by a frame of mind which complies us to discard every emotion or idea that might

The gap between cars would become less of a moral issue than a calculative one as non-material couplings struggle to compute the correct distance between cars at this weight, with this speed, on these corners and so on (Latour 1996). Cars with drivers will probably not disappear entirely – like sailing boats and riding horses, driving cars will continue as an exotic leisure pastime. But the car's role in the expression of identity, citizenship, social status, responsibility, maturity and recognition of the moral order will be found elsewhere as trains of driverless cars allow the meeting of wills to be replaced by calculations of logistics.

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impair our alertness to the impersonal demands assailing us' (Horkheimer 1947).

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